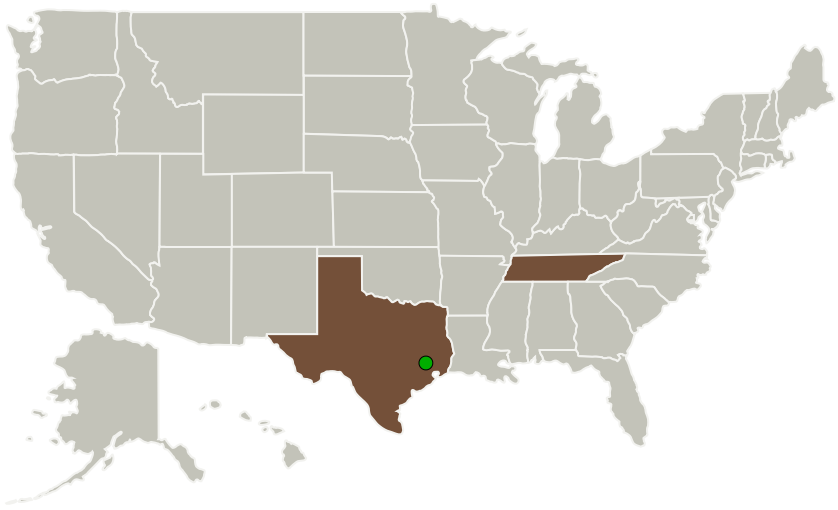
High Reliability Cryogenic Piezoelectric Valve Actuator, Phase II

Completed Technology Project (2011 - 2013)

Project Introduction

Cryogenic fluid valves are subject to harsh exposure and actuators to drive these valves require robust performance and high reliability. DSM's piezoelectric actuators offer advantages over traditional alternative actuator technology. However, in order to use piezoceramic actuators in cryogenic fluid handling applications, proof of operational reliability and improvements in thermal neutral response are required. During the Phase I, DSM experienced great successes and found multiple compelling reasons to continue into Phase II. Particular successes include: gaining access to a new piezoceramic material with superior cryogenic performance, demonstrating a flight-like vibration test survivability level for a small actuator sample set, and, development of a novel composite actuator with excellent neutral thermal response. The outcome of the Phase I yields multiple compelling reasons to continue into Phase 2. The potential for application of this actuator technology to cryogenic fluid valves is substantial with interested NASA advisors at NASA JSC, MSFC, and GRC.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Dynamic Structures and Materials, LLC	Lead Organization	Industry	Franklin, Tennessee
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

High Reliability Cryogenic Piezoelectric Valve Actuator, Phase II

Table of Contents

High Reliability Cryogenic Piezoelectric Valve Actuator, Phase II

Completed Technology Project (2011 - 2013)

Primary U.S. Work Locations	
Tennessee	Texas

Project Transitions

June 2011: Project Start

September 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138935)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Dynamic Structures and Materials, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jeffrey S Paine

Co-Investigator:

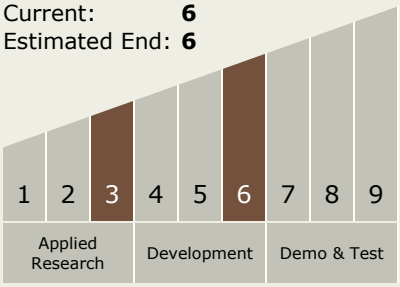
Jeffrey Paine

High Reliability Cryogenic Piezoelectric Valve Actuator, Phase II

Completed Technology Project (2011 - 2013)

Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System